

What does the evidence tell us about
FOOT ORTHOSES FOR RUNNERS

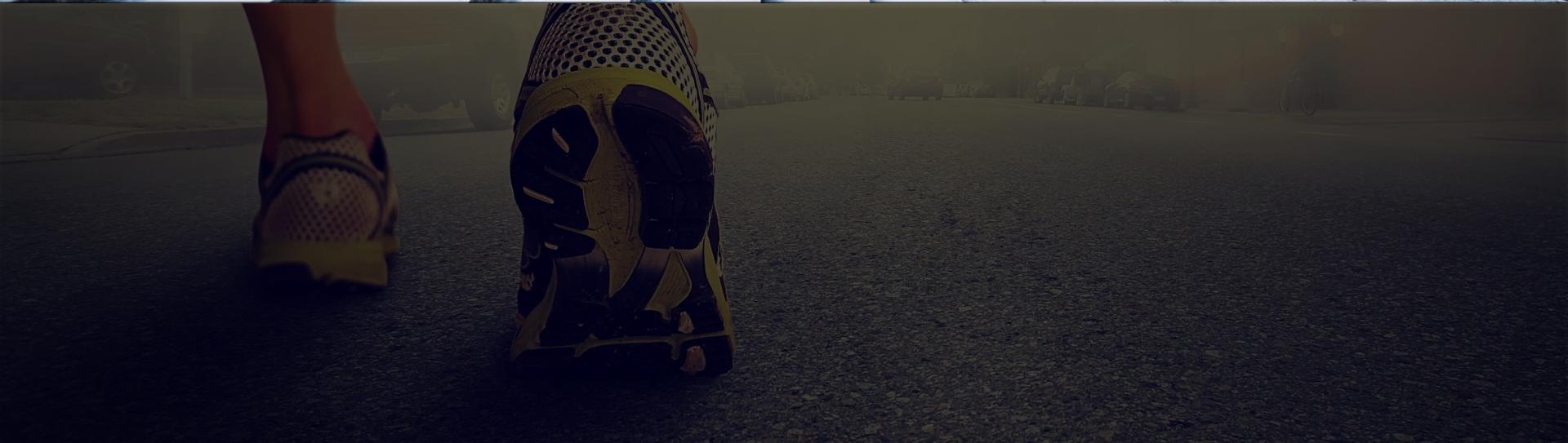
Glen Whittaker



Fitzroy Foot and Ankle Clinic



Prevention of injury



A woman in a blue long-sleeved shirt and dark leggings is captured in mid-stride while running up a wide set of grey concrete stairs. The background shows a light-colored wall.

Prevention of injury

A blurry, overexposed background image of a city street at dusk or dawn. Several cars are parked along the side of the road, and a few are visible driving away. The overall atmosphere is hazy and suggests an urban environment.

Treatment of common injuries

Case-study

- “Jane”
- 37 year old female
- Bulimia
 - recurrent metatarsal stress fractures
- Advice on prevention

Prevention of injury

- 18 randomised trials
 - foot orthoses
 - shock absorbing insoles
- Injury data
 - soft tissue injuries
 - stress fractures
 - specific injuries

Review

Effectiveness of foot orthoses and shock-absorbing insoles for the prevention of injury: a systematic review and meta-analysis

Daniel R Bonanno,^{1,2} Karl B Landorf,^{1,2,3} Shannon E Munteanu,^{1,2} George S Murley,¹ Hylton B Menz^{1,2}

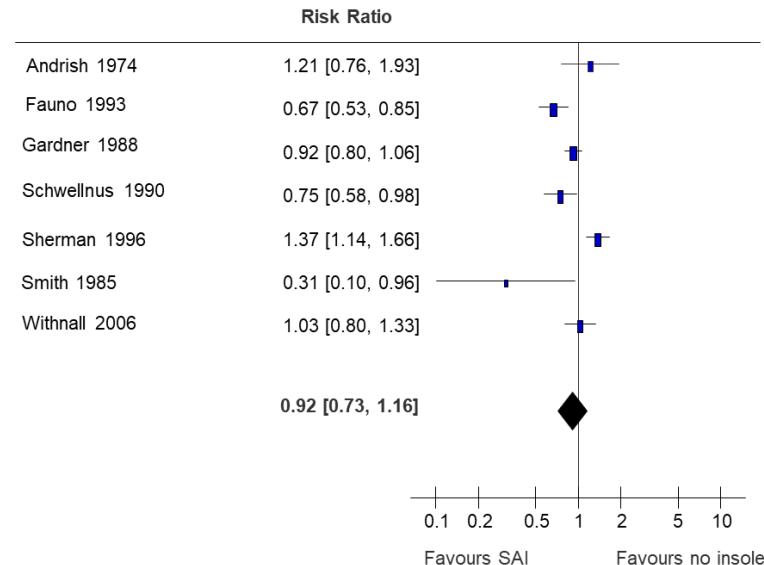
Shock absorbing insoles do NOT reduce the risk of injury

- 7 trials
 - 5 conducted on military recruits
 - 1 conducted on soccer referees
 - 1 conducted on coast guards



Shock absorbing insoles do NOT reduce the risk of injury

- ☒ Overall injury
- ☒ Stress fractures
- ☒ Soft-tissue injuries
- ☒ Specific injuries
- ☒ Quality



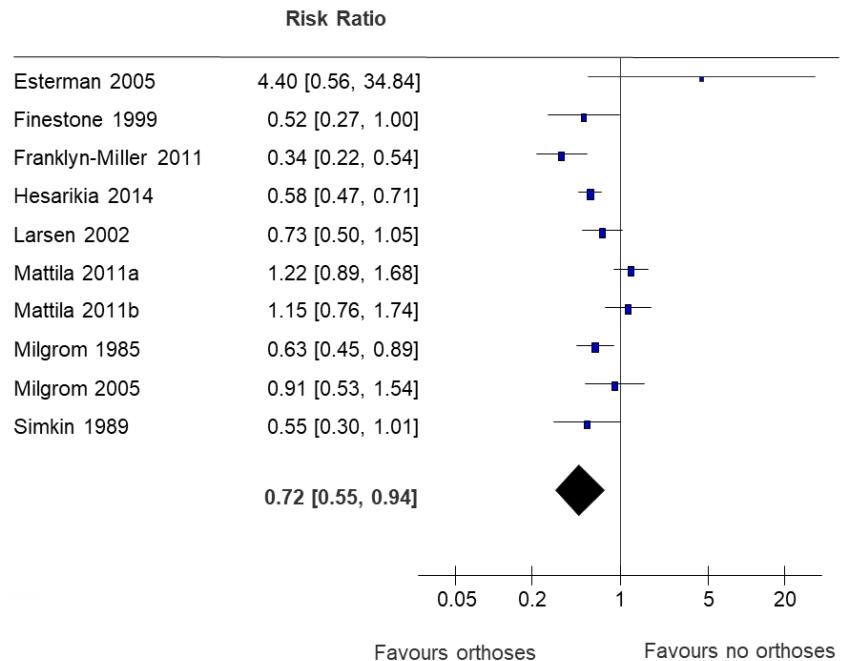
Foot orthoses reduce the risk of injury

- 11 trials
 - all conducted on military recruits
 - 2 evaluated custom-made orthoses
 - 8 evaluated prefabricated orthoses
 - 1 evaluated both



Foot orthoses reduce the risk of injury

- ✓ Overall injury
- ✓ Stress fractures
- ✓ Shin pain
- ✗ Soft-tissue injuries
- ✗ Quality



On Monday morning . . .

- Don't recommend shock absorbing insoles



On Monday morning . . .

- Don't recommend shock absorbing insoles
- Use foot orthoses to prevent:
 - Bone injuries
 - stress fractures
 - shin pain
- Don't use foot orthoses to prevent soft tissue injuries



On Monday morning . . .

- Case-study?



FOOT ORTHOSES FOR THE TREATMENT OF INJURY

1. Medial tibial stress syndrome
2. Plantar heel pain
3. Patellofemoral pain

Case-study

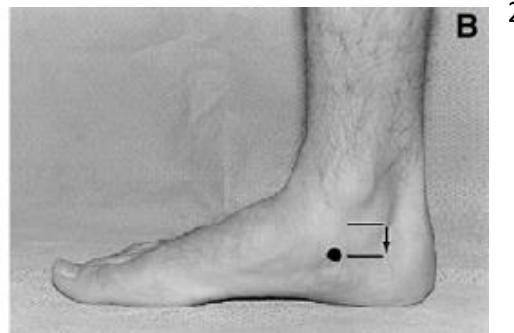
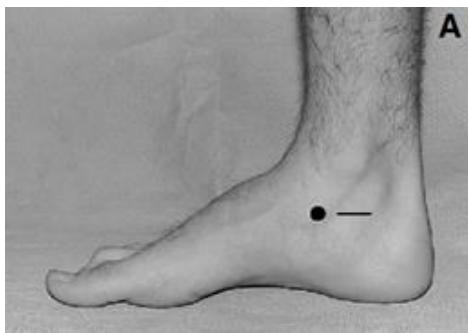
- “Joy”
- 76 year old female
- “desire to run”
- patellofemoral pain

Medial tibial stress syndrome

No randomised trials that have investigated foot orthoses

Medial tibial stress syndrome

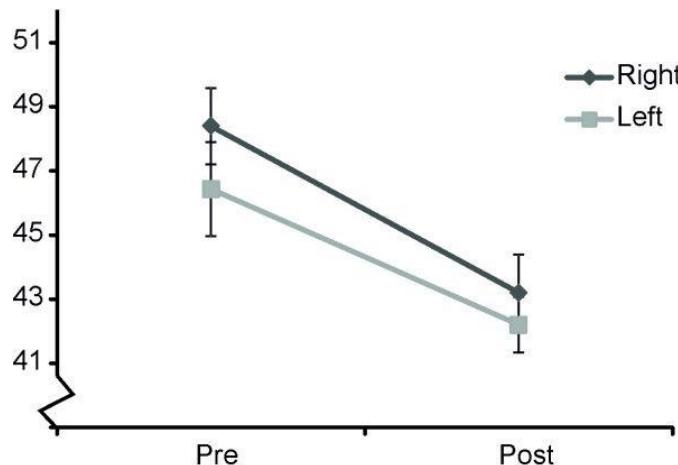
- Risk factors
 - A key risk factor is navicular drop¹



1. Hamstra-Wright et al. BJSM. 2015
2. Menz. J Am Pod Med Ass. 1998

Medial tibial stress syndrome

- Risk factors
 - average navicular height reduced by 5 mm over half marathon¹



Foot orthoses and stretching may be effective

- Cohort study¹
 - 23 participants with MTSS
 - run > 10 miles/week
 - prefabricated foot orthoses + calf stretches



1. Loudon et al. Foot Ankle Spec. 2010

Foot orthoses and stretching may be effective

- Results
 - 65% had a successful* improvement
 - 83% males; 44% of females
 - Duration of symptoms
 - 181 weeks in the successful group
 - 412 weeks in the unsuccessful group



Plantar heel pain

- Limited evidence in athletic population

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Effectiveness of orthotic shoe inserts in the long-distance runner

MICHAEL L. GROSS,* MD, LANCE B. DAVLIN, MD, AND PHILIP M. EVANSKI, MD



Plantar heel pain

- 347 runners treated with orthoses¹
 - 75% had resolution or great improvement

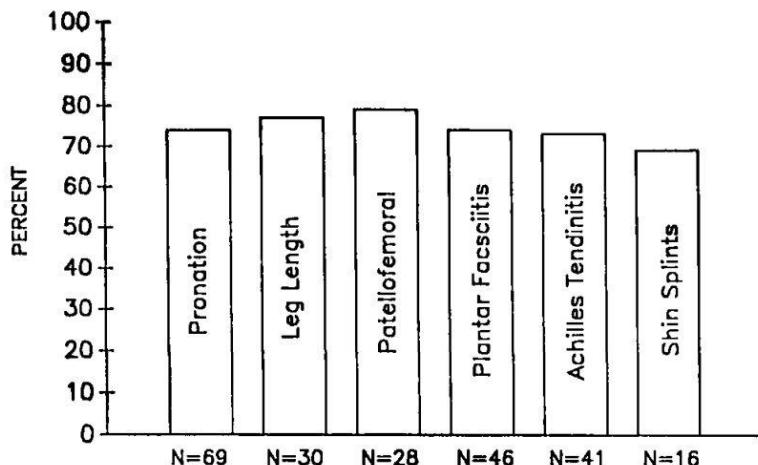


Figure 2. The percent of runners with complete relief or great improvement by presenting diagnosis.



1. Gross et al. Am J Sports Med. 1991

Foot orthoses reduce plantar heel pain

- Foot orthoses in a non-athletic population¹

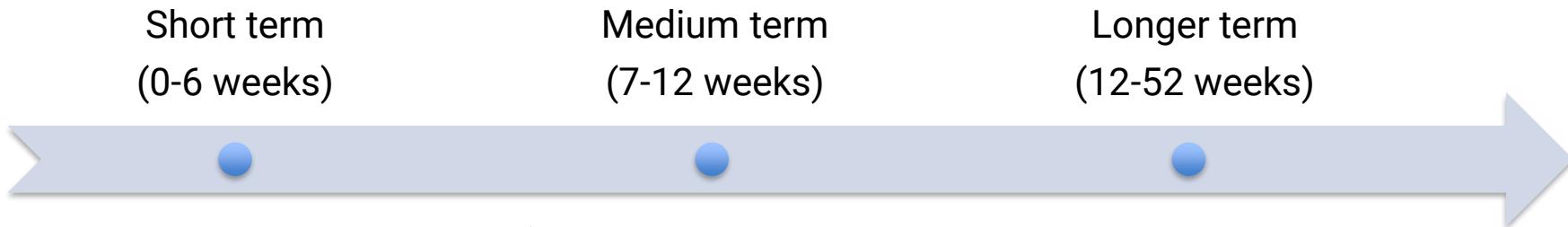
Review

Foot orthoses for plantar heel pain: a systematic review and meta-analysis

Glen A Whittaker,^{1,2} Shannon E Munteanu,^{1,2} Hylton B Menz,^{1,2} Jade M Tan,^{1,2}
Chantel L Rabusin,^{1,2} Karl B Landorf^{1,2}

Foot orthoses reduce plantar heel pain

- Results for pain¹



- | | | |
|--|--|--|
| <input checked="" type="checkbox"/> No differences | <input checked="" type="checkbox"/> Custom better than sham | <input checked="" type="checkbox"/> No differences |
| | <input checked="" type="checkbox"/> Custom better than night splints | |

Foot orthoses reduce plantar heel pain

Participant characteristics

No. of participants

1,660

% female

67% (range 23-89)

Mean age

47 (range 41-59)

Mean BMI

30 kg/m² (range 28-33)

Patellofemoral pain

- 3 good quality randomised trials
 - 1 trial in athletic population¹

RESEARCH ARTICLE

Altering Knee Abduction Angular Impulse Using Wedged Insoles for Treatment of Patellofemoral Pain in Runners: A Six-Week Randomized Controlled Trial

Ryan T. Lewinson^{1,2,3*}, J. Preston Wiley^{1,3,4}, R. Neil Humble³, Jay T. Worobets¹, Darren J. Stefanyshyn^{1,2}

1 Human Performance Laboratory, Faculty of Kinesiology, University of Calgary, Calgary, Alberta, Canada,
2 Biomedical Engineering Program, Schulich School of Engineering, University of Calgary, Calgary, Alberta, Canada, **3** Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada, **4** Sport Medicine Centre, Faculty of Kinesiology, University of Calgary, Calgary, Alberta, Canada

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Foot orthoses reduce patellofemoral pain

- 27 runners randomised to:
 - 3 mm lateral wedge
 - 6 mm medial wedge
- Follow-up at 6 weeks
- Results
 - clinically meaningful pain reduction in both groups
 - no difference between the groups



Foot orthoses reduce patellofemoral pain

- Non-athletic population
- Single-blind, randomised trial

Original article

A randomised control trial of short term efficacy of in-shoe foot orthoses compared with a wait and see policy for anterior knee pain and the role of foot mobility

Kathryn Mills,^{1,2} Peter Blanch,² Priya Dev,³ Michael Martin,³ Bill Vicenzino¹

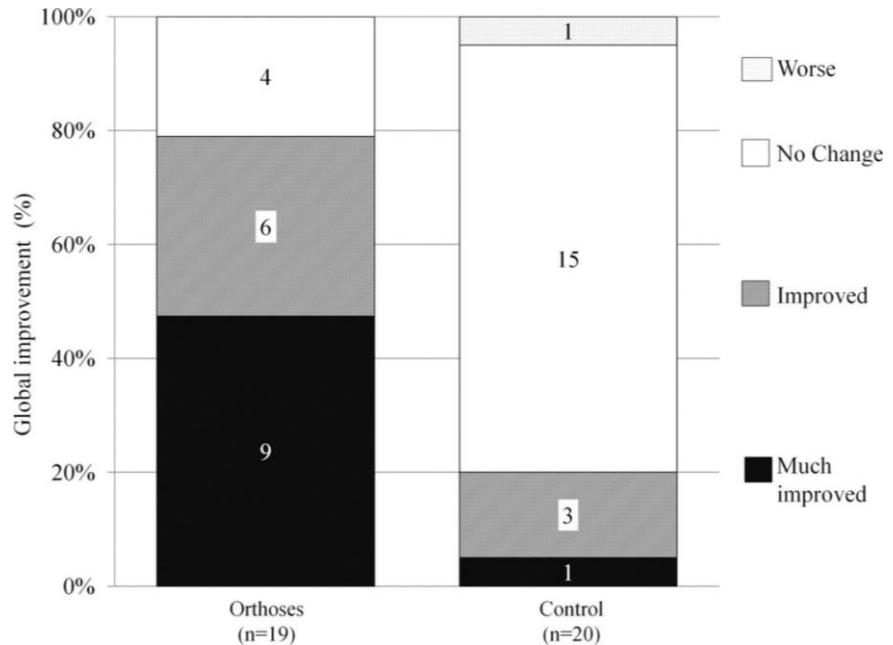
Foot orthoses reduce patellofemoral pain

- 40 participants randomised to:
 - prefabricated foot orthoses
 - wait-and-see
- Follow-up at 6 weeks
- Primary outcome
 - global improvement



Foot orthoses reduce patellofemoral pain

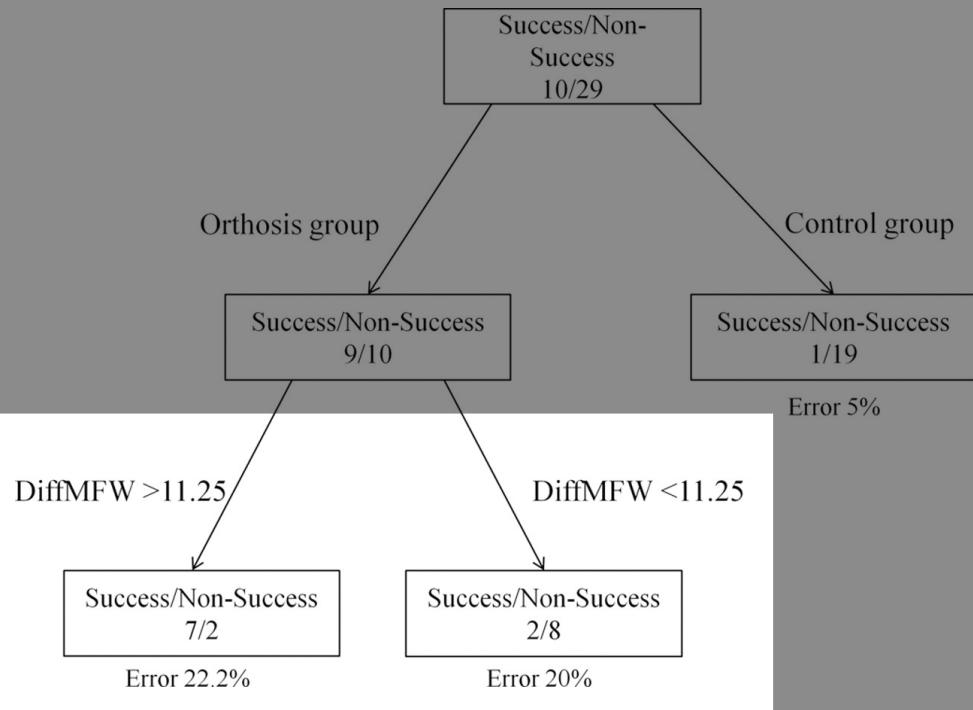
- Results



1. Mills et al. Br J Sports med. 2012

Foot orthoses reduce patellofemoral pain

- Results



1. Mills et al. Br J Sports med. 2012

Foot orthoses reduce patellofemoral pain

A clinical prediction rule for identifying patients with patellofemoral pain who are likely to benefit from foot orthoses: a preliminary determination

Bill Vicenzino,¹ Natalie Collins,¹ Joshua Cleland,^{2–4} Thomas McPoil^{1,5}



Foot orthoses reduce patellofemoral pain

Consensus statement

2018 Consensus statement on exercise therapy
and physical interventions (orthoses, taping and
manual therapy) to treat patellofemoral pain:
recommendations from the 5th International
Patellofemoral Pain Research Retreat, Gold Coast,
Australia, 2017

Natalie J Collins,^{1,2} Christian J Barton,^{2,3} Marienke van Middelkoop,⁴
Michael J Callaghan,⁵ Michael Skovdal Rathleff,⁶ Bill T Vicenzino,¹ Irene S Davis,⁷
Christopher M Powers,⁸ Erin M Macri,^{9,10} Harvi F Hart,^{2,11} Danilo de Oliveira Silva,^{2,12}
Kay M Crossley²

On Monday morning . . .

- Who knows if you have a patient with MTSS?
 - perhaps use navicular drop as a guide
- Use foot orthoses for plantar heel pain
 - unclear for an athletic population?
- Use foot orthoses for patellofemoral pain
 - especially in those with greater midfoot mobility



On Monday morning . . .

- Case-study?





Fitzroy Foot and Ankle Clinic

THANK YOU.

References

- Bonanno, D. R., Landorf, K. B., Munteanu, S. E., Murley, G. S., & Menz, H. B. (2017). Effectiveness of foot orthoses and shock-absorbing insoles for the prevention of injury: a systematic review and meta-analysis. *Br J Sports Med*; 2017;51:2: 86–96. <http://doi.org/10.1136/bjsports-2016-096671>
- Hamstra-Wright KL, Bliven KCH, Bay C. Risk factors for medial tibial stress syndrome in physically active individuals such as runners and military personnel: a systematic review and meta-analysis. *Br J Sports Med*; 2015;49: 362–9. . <http://doi.org/10.1136/bjsports-2014-093462>
- Cowley E, Marsden J. The effects of prolonged running on foot posture: a repeated measures study of half marathon runners using the foot posture index and navicular height. *J Foot Ankle Res*; 2013;6: 20. <http://doi.org/10.1186/1757-1146-6-20>
- Menz HB. Alternative techniques for the clinical assessment of foot pronation. *J Am Podiatr Med Assoc*. 1998;88: 119–29. <http://doi.org/10.7547/87507315-88-3-119>
- Gross ML, Davlin LB, Evanski PM. Effectiveness of orthotic shoe inserts in the long-distance runner. *Am J Sports Med*; 1991;19: 409–412. <http://doi.org/10.1177/036354659101900416>
- Whittaker GA, Munteanu SE, Menz HB, Tan JM, Rabusin CL, Landorf KB. Foot orthoses for plantar heel pain: a systematic review and meta-analysis. *Br J Sports Med*; 2018;52: 322–328. <http://doi.org/10.1136/bjsports-2016-097355>
- Lewinson RT, Wiley JP, Humble RN, Worobets JT, Stefanyshyn DJ. Altering knee abduction angular impulse using wedged insoles for treatment of patellofemoral pain in runners: a six-week randomized controlled trial. Trumbower RD, editor. *PLoS One*; 2015;10: e0134461. <http://doi.org/10.1371/journal.pone.0134461>
- Mills K, Blanch P, Dev P, Martin M, Vicenzino B. A randomised control trial of short term efficacy of in-shoe foot orthoses compared with a wait and see policy for anterior knee pain and the role of foot mobility. *Br J Sports Med*; 2012;46: 247–52. <http://doi.org/10.1136/bjsports-2011-090204>
- Vicenzino B, Collins N, Cleland J, McPoil T. A clinical prediction rule for identifying patients with patellofemoral pain who are likely to benefit from foot orthoses: a preliminary determination. *Br J Sports Med*; 2010;44: 862–6. . <http://doi.org/10.1136/bjsm.2008.052613>
- Collins NJ, Barton CJ, van Middelkoop M, Callaghan MJ, Rathleff MS, Vicenzino BT, et al. 2018 Consensus statement on exercise therapy and physical interventions (orthoses, taping and manual therapy) to treat patellofemoral pain: recommendations from the 5th International Patellofemoral Pain Research Retreat, Gold Coast, Australia, 2017. *Br J Sports Med*; 2018; bjsports-2018-099397. <http://doi.org/10.1136/bjsports-2018-099397>